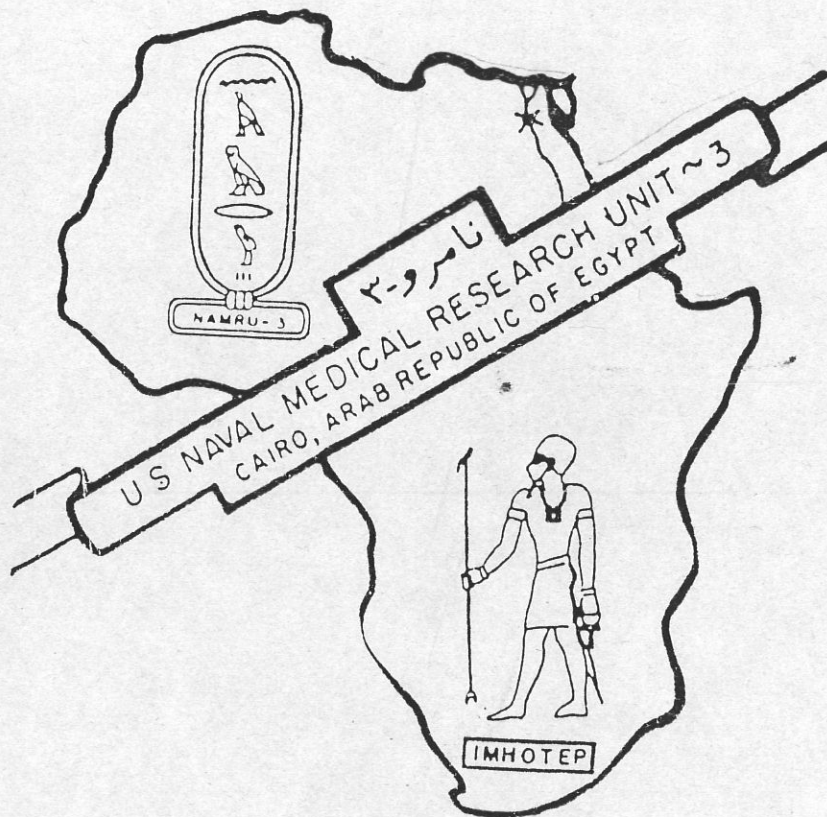


US NAVAL MEDICAL RESEARCH UNIT
NO. 3
CAIRO, ARAB REPUBLIC OF EGYPT



U.S. Naval Medical Research Unit #3
Adjacent to Abassia Fever Hosp

VISITOR INFORMATION
1992

Ramses Street Extension
Abassia code No. 11517
Cairo, Egypt

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**VISITOR INFORMATION
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1. MISSION

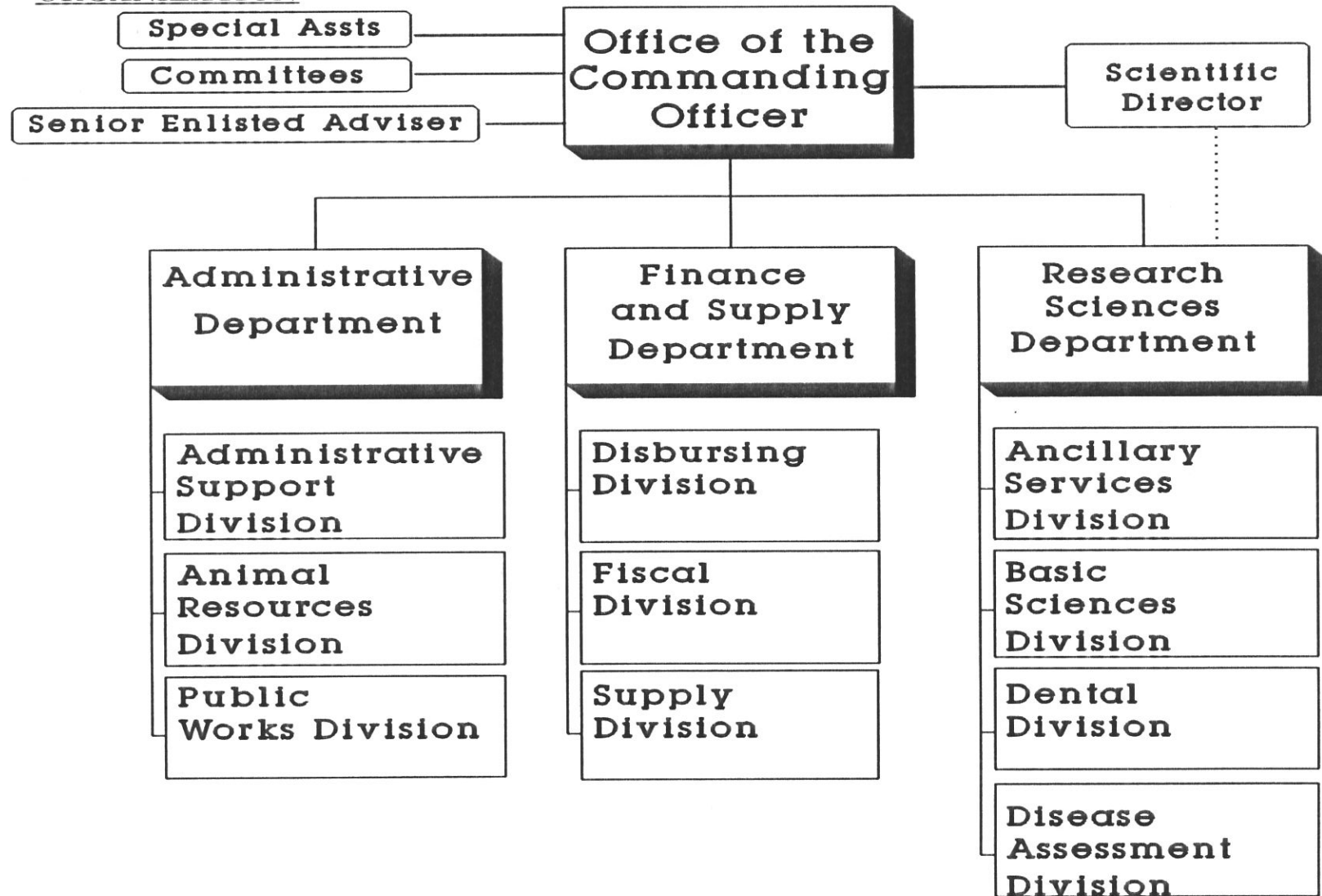
Mission

- To conduct research, development, test and evaluation to enhance the health, safety, and readiness of Navy and Fleet Marine personnel assigned to Southwest Asia and Africa in the performance of peacetime and contingency missions, and to perform other such functions as may be directed by higher authority.

Functions

- Conduct research programs in infectious diseases (ID) which directly relate to military medical requirements and operational needs.
- Conduct interactive ID research with Navy and other DOD medical R&D laboratories specifically in areas of preventive medicine, epidemiology and tropical medicine.
- Develop and maintain capability to provide ID risk assessment information and conduct research and development to improve prevention, diagnosis, and treatment of ID in the Fleet and Fleet Marine Force.
- Maintain a technology base and scientific and technical expertise in infectious disease and tropical medicine to provide advisory assistance when requested.
- Provide or undertake such other appropriate functions as may be authorized or directed.

2. ORGANIZATION



3. INTRODUCTION - HISTORY

The United States Typhus Commission was established by presidential order in 1942 to develop effective prevention and control measures for typhus. A research laboratory associated with the Abbassia Fever Hospital in Cairo, Egypt and staffed by American scientists and technicians was established to address the typhus problem among troops in North Africa. The Typhus Commission played a major role in averting a serious typhus outbreak during and following World War II. After the war, the Navy was invited by the Egyptian government to continue collaborative studies of endemic tropical and subtropical diseases with Egyptian scientists. In response to this request, the Naval Medical Research Unit No. 3 (NAMRU-3) was formally established, at the site of the former Typhus Commission, by the Secretary of the Navy in 1946.

NAMRU-3 was the second laboratory the United States Navy established overseas; the first was NAMRU-2 established briefly in Guam in 1945, disestablished after several months and then reestablished in 1947 in Taiwan. The early work at NAMRU-3 focused on rickettsial diseases and those febrile diseases admitted to the Abbassia Fever Hospital (cholera, smallpox, meningitis), in liaison with the Egyptian Ministry of Health.

In 1967, there was a break in U.S.-Egyptian relations. All Americans were required to leave Egypt, and the Egyptian staff maintained NAMRU-3 during their absence. After several months, the Unit's Commanding Officer, Captain Miller, returned to Egypt and demanded readmission to continue the work of NAMRU-3. He was allowed to return, and for the next 7 years NAMRU-3 was directed by Dr. Imam Zaghoul as the Egyptian co-director and by a U.S. Naval Officer as the Commanding Officer. The command's supplies arrived via the Spanish Embassy and research continued. Thus, NAMRU-3 has been in continuous operation since 1946 despite the 7 year lapse of U.S.-Egyptian diplomatic relations. In 1974 U.S.-Egyptian political relations were resumed and the Egyptian co-director of NAMRU-3 was no longer required.

In the late 60's and early 70's, the expansion of field studies in the Sudan and Ethiopia led to the establishment of auxiliary NAMRU-3 field laboratories in these two countries for the study of leishmaniasis and malaria. The auxiliary field laboratory detachment in Addis Ababa, Ethiopia eventually developed into an independent unit which functioned as NAMRU-5 from 1974-1977 until evacuated and closed following communist takeover of the national government.

The expansion of NAMRU-3 facilities in 1983, with the addition of a new \$10 million six story basic science building, and the addition of 20 scientific personnel from 1983 to 1989, established the Unit as the largest and most versatile overseas Department of Defense infectious disease research laboratory. Current overseas U.S. Navy research laboratories include NAMRU-3 in Cairo; NAMRU-2 in Jakarta, Indonesia with a detachment in Manila, PI; and the Naval Medical Research Institute Detachment Lima, Peru. The U.S. Army currently has overseas laboratories in Thailand, Korea, Brazil and Kenya.

For the past 46 years, NAMRU-3 has studied numerous tropical and subtropical infectious diseases, including enteric diseases, malaria, schistosomiasis, acute respiratory infections, tuberculosis, Q-fever, brucellosis, filariasis, leishmaniasis, meningitis and a host of others. NAMRU-3 played an active role, along with the World Health Organization, in the assessment of prototype vaccines for typhoid fever and for group A meningococcal meningitis. NAMRU-3 has become a center of research on the Human Immunodeficiency Virus (HIV), arbovirus diseases, and a platform for the testing of drugs and vaccines against various infectious diseases.

NAMRU-3 has affiliations with over 42 major research, clinical and health organizations throughout the world. These include numerous universities, international and U.S. agencies such as the World Health Organization (WHO), the Centers for Disease Control (CDC), U.S. Agency for International Development (USAID), Veterans Administration (VA), the National Research Council (NRC), the Multinational Forces and Observers (MFO), various foundations such as the Fulbright Foundation and the Bioanthropological Society, and Ministries of Health outside Egypt. Overwhelmingly, the most important NAMRU-3 collaboration in Egypt is with the Ministry of

Health (MOH). NAMRU-3 has also developed close working relationships with the Abbassia Fever Hospital, Cairo; Bilbeis Epidemiological Study Unit, Bilbeis; Center for Applied Research, Menofeya; the Central Public Health Laboratory, Cairo; the Hurghada Fever Hospital, Hurghada; the Ain Shams University, Cairo; the University of Alexandria, Alexandria, and Suez Canal University, Ismailia. Increasingly, MOH and other Egyptian personnel are recruited as co-investigators in field and laboratory research. Additional collaborations are in effect with Djibouti, Ethiopia, Yemen, Somalia and Sudan.

Significant collaborative research accomplishments have occurred in recent years.

- In 1987, NAMRU-3 was designated a World Health Organization Collaborating Center for AIDS, Eastern Mediterranean Region. This designation is indicative of the degree of trust and acceptance of this laboratory in this region.
- In 1987, NAMRU-3 was selected by the Naval Medical Research and Development Command (Bethesda, MD) as the site for the consolidation of all Navy research on schistosomiasis.
- In 1989, a training grant was received from USAID to allow NAMRU-3 to serve as the American collaborator with Egyptian Universities and principal investigators for schistosomal vaccine development and serodiagnostic research.
- In 1989-1990, the command's first longitudinal, community based infectious disease surveillance (acute respiratory, arboviral and rickettsial infections) in rural Egypt was established in collaboration with the MOH, with funding from USAID.

- In 1990, NAMRU-3 was selected by the US Army to conduct the first large scale field trial of a schistosomal topical antipenetrant (TAP) lotion (1% niclosamide) for the prevention of schistosomiasis.
- In late 1990 and early 1991, NAMRU-3 provided personnel and laboratory support to the Navy Forward Laboratory, Jubail, Saudi Arabia, during Operations Desert Shield/Storm.
- In 1991, NAMRU-3 began a longitudinal, community based study of enteric infectious diseases in rural villages near Alexandria, in collaboration with the MOH and the University of Alexandria.
- In 1991, NAMRU-3 collaborated with the CDC and the MOH in investigating a foodborne botulism (Type E) outbreak in Cairo.
- In early 1992, NAMRU-3 was selected as a participant in the Post-Doctoral Research Associateship Program of the National Research Council.

4. PERSONNEL

Personnel expertise at NAMRU-3 is quite varied. Physicians are represented by internal medicine, infectious disease, pediatric infectious disease, and public health and preventive medicine specialties. There are dentists, veterinarians, nurses and engineers. Scientists include virologists, microbiologists, parasitologists, molecular biologists, entomologists, epidemiologists, biochemists, immunologists and medical zoologists, all assisted by a wide variety of laboratory and field technicians. Support staff include specialists and people working in areas of administration, finance, supply, engineering, electrical, mechanical, carpentry, plumbing, postal, photography, automotive, computers, personnel, library science, construction, animal breeding and colony support, in addition to secretarial and clerical support staff.

Among the active duty U.S. Navy Officer staff are specialists in administration, finance, supply, engineering, medicine and medical research science. NAMRU-3 also has a U.S. Army veterinarian. The Enlisted Navy staff includes general purpose hospital corpsmen, medical repair technicians, laboratory technicians, disbursing clerks, public works specialists, and a postal clerk. In addition, NAMRU-3 employs a U.S. Army laboratory animal technician. General Service (GS) government employees include administrative personnel and research scientists, and the Intergovernmental Personnel Act (IPA) employees include only physicians and research scientists. The remainder, and majority, of the NAMRU-3 staff include Foreign Service National (FSN) employees, including physicians, nurses, research scientists, engineers, laboratory technicians, and various administrative, public works, supply, fiscal and other support personnel. A table summarizing these positions is shown below.

SCIENCE PERS	OFF.	ENLIS.	GS/GM	IPA	FSN	TOTAL
Professional	10	0	5	8	21	44
Technical	0	9	1	0	72	82
Total	10	9	6	8	93	126
ADMIN SUPPORT	OFF.	ENLIS.	GS	IPA	FSN	TOTAL
Professional	6	4	0	0	7	17
Technical	0	7	5	0	102	114
Total	6	11	5	0	109	131
COMMAND TOTAL	16	20	11	8	202	257

5. FACILITIES

The equipment and resources at NAMRU-3 make it competitive with any major research laboratory in the United States.

- **3 ACRE COMPOUND WITH 27 BUILDINGS**
 - *68,224 Sq Ft laboratory space.*
 - *9,058 Sq Ft office space.*
 - *10,609 Sq Ft warehouse and supply storage.*
- **BIOMEDICAL RESEARCH SCIENCE BUILDING**
 - *6 story state-of-the-art design.*
 - *Opened in 1983.*
 - *2750 Sq Ft P-3 level biohazard containment.*

- *Backup emergency generators.*
- *Modern ventilation and waste disposal design.*
- **LIBRARY**
 - *3 stories.*
 - *Subscription to over 75 scientific journals.*
 - *Houses over 7000 reference books.*
 - *Interacts with Library of Medicine (Bethesda) via CD-ROM and computer link through USAID.*
- **SNAIL BREEDING LABORATORY**
 - *Produces over 1 million cercariae per day.*
- **INSECTARY**
 - *Supports colonies of disease vectors such as ticks, mosquitoes and sandflies.*
- **ANIMAL FACILITY**
 - *Barrier Facility for breeding inbred mouse strains.*
- **SUPPORT FACILITIES**
 - *Administration, Finance, Supply, Public Works, Pharmacy, Medical Equipment Repair.*
- **ABBASSIA FEVER HOSPITAL (1500 BED)**
 - *Immediately adjacent to NAMRU-3*
 - *Largest MOH Infectious Disease Hospital.*

6. RESEARCH PROGRAMS

The primary objective of military medical research is to conduct research on infectious diseases of military importance, particularly in the areas of epidemiology, treatment and prevention. During the last 50 years of military history, infectious diseases have been the major cause of casualties, both during war and especially during peace. NAMRU-3 conducts infectious disease research with emphasis on pathophysiology/immunology, rapid diagnosis, epidemiology and treatment/prevention. Some of the general infectious diseases areas studied are noted below, followed by specific research protocols that make up all of NAMRU-3's research efforts.

A. *Acute Respiratory Infections (ARI)*

NAMRU-3 is studying ARI in Egypt, Djibouti and Yemen. As part of a comprehensive virology laboratory capability, NAMRU-3 can recover in tissue culture

systems and identify, by immunofluorescence or ELISA, the following respiratory viruses: Influenza A and B, parainfluenza 1-3, respiratory syncytial virus and adenoviruses.

B. *Diarrheal Diseases and Enteric Fevers*

In Egypt, diarrhea continues to be a major cause of mortality; it is estimated that 70,000 infants and children die of diarrhea yearly. Although oral rehydration solution is widely used with success, it is estimated that Egyptian children experience 6 episodes of diarrhea per year. One half of these episodes are exudative types of diarrhea and ten percent chronic diarrhea. NAMRU-3 has established a longitudinal study of a rural village near Alexandria. Its objective is to define the causes of diarrhea in Egyptian children, and to develop an algorithm for early classification of diarrhea which will guide prompt and appropriate treatment. NAMRU-3 is initiating work also in Zambia, particularly to study invasive *Shigella*. These studies will be equally valuable for identification of probable causes of diarrhea in U.S. forces, and may lead to vaccine safety and efficacy studies.

NAMRU-3 is also trying to determine the best regimens of chemotherapy for typhoid/paratyphoid (enteric) fevers.

C. *Febrile Illness/Sepsis*

A major project for NAMRU-3 since the era of the USA Typhus Commission and research on cholera has been a study of the pathophysiology and treatment of acute systemic infections. Much of the patient material came from the adjacent Abbassia Fever Hospital. NAMRU-3 has supported the in-patient facility and staff of Egyptian clinical investigators has been supplemented by U.S. Navy medical research personnel.

Presently, studies focus on antibiotics and/or chemotherapy for such life threatening diseases as enteric fevers, bacterial meningitis, tuberculosis, Q-fever, brucellosis, and amebic liver abscess. Also studied are filariasis, fascioliasis, trichinosis, echinococcosis, giardiasis and toxoplasmosis. The work evaluates newer generation antibiotics and antibiotic combinations in an area of the world where pathogenic human microorganisms are under constant drug pressure. Reports obtained are vital to the appropriate and economical treatment of U.S. military personnel who become infected in this geographical region. Completed studies are conscientiously submitted for publication in the world literature.

D. *HIV and Other Viruses in Northeast Africa*

The designation of NAMRU-3 as a WHO Collaborative Center for AIDS provides a base for collaboration with northeast African countries in surveying populations for evidence of HIV infections. NAMRU-3 has conducted research in the past in Sudan, Ethiopia and Somalia, and is currently collaborating with Egypt and Djibouti in serologic surveys of high risk populations, referring HIV 1 and HIV 2 strains to the Walter Reed Army Institute of Research (WRAIR) for characterization.

Other interests of NAMRU-3 include studies on tuberculosis in HIV infections and evaluation of HIV diagnostic tests.

NAMRU-3 has generated data on high risk populations in Egypt, Somalia, Djibouti and Sudan and is now collaborating with Yemen and Senegal. Because of the difficulties in collecting sera and the lack of enthusiasm by most governments to clarify the extent of the HIV problem, the number of sera collected from populations in these countries remains small. Nevertheless, the findings indicate a pattern of HIV spread in southern areas of the region consistent with such bordering countries as Kenya and Uganda. In Egypt, since 1986, prevalence rates among high risk populations (excluding blood recipients) have remained low at >0.1 to 2 percent.

In addition, NAMRU-3 is evaluating the immunogenicity of hepatitis A vaccine in adults, the pediatric dose of hepatitis B vaccine in infants, and is conducting clinical and epidemiologic research on Non-A, Non-B hepatitis in Egypt and elsewhere.

E. *Schistosomiasis*

Investigations related to schistosomiasis represent the most active area of laboratory-based research at NAMRU-3. A substantial financial contribution from USAID has strengthened the military program. For example, approximately \$2 million was provided for a 2-year commitment to purchase equipment, train and support Egyptian researchers, some of whom collaborate in NAMRU-3 studies. USAID support somewhat coincidentally followed the consolidation of schistosomiasis research by the U.S. Navy and Army. This resulted in the assignment of all schistosomiasis investigators to NAMRU-3. This facilitates meaningful interaction with Egyptian investigators involved in schistosomiasis research (3 principal investigators from the Theodore Bilharz Institute, 1 each from the National Research Center, Cairo University, and Ain-Shams University). An effective group of research scientists is in place at NAMRU-3 sufficient to develop immunodiagnostic tests and anti-schistosome vaccines. The major areas of research include vaccine development, diagnostic technology, clinical investigations of patients with schistosomiasis, and study of the effectiveness of topical niclosamide in prevention of schistosome infection in humans. Niclosamide has been shown to be an effective agent to prevent cercarial penetration in experimental animals. In the current double-blind studies, groups of Egyptian farmers are being given curative chemotherapy and then divided into groups which will apply placebo lotion or lotion containing 1% niclosamide.

F. *Vector-borne Parasitic Diseases (Leishmaniasis):*

The occurrence of 20-30 cases of cutaneous leishmaniasis in U.S. military forces in Saudi Arabia during Operation Desert Shield/Storm, as well as endemic cutaneous leishmaniasis in the Sinai, are operational reasons to expand the current research program. Currently, work is done in Egypt, including the Sinai with the Multinational Forces and Observers (MFO), and concentrated in 3 primary areas:

1. Identification of the sandfly vectors that transmit *L. major*.
2. Determination of which rodent species are the major reservoirs of human infection.

3. Determination of whether New World Leishmania has been introduced into the Sinai, possibly by Colombian military members of the multinational peace keeping force.

G. *Vector-borne Parasitic Diseases (Filariasis):*

NAMRU-3 is studying the possible benefits of two-single doses of treatment on Wuchereria bancrofti microfilaremia, and the potential impact of this treatment on filariasis control.

H. *Arboviral Infections and Rickettsioses*

The Virology Branch maintains an enormous diagnostic capability which includes most important human viral pathogens. In addition to the respiratory viruses listed above, virus isolation and serological test capability for dengue 1-4, sandfly fever viruses, West Nile, Quaranfil, chikungunya, Sindbis, hepatitis A, B, and C, HTLV-I, HIV-1 and 2, Hantaan viruses, Lassa fever, Ebola, Marburg, Congo-Crimean hemorrhagic fever, Rift Valley fever, and rickettsia such as C. burnetii, R. conori, R. prowazekii, R. typhi.

With the establishment of the Bilbeis study Unit NAMRU-3 is conducting epidemiologic, clinical, pathophysiologic and basic science observations on a group of viral pathogens in an Egyptian population and to provide excellent training for Egyptian epidemiologists and virologists. The Bilbeis fever study is a collaborative project between the Egyptian Ministry of Health, USAID, Ain Shams University and NAMRU-3. The study is a two-year etiological profile of children living in a typical Nile delta farming community. A large field laboratory and clinic to support this study has been established. From this collaboration, a number of Egyptian field epidemiologists, viral, bacterial and entomologic professionals and technicians are receiving practical research training.

Bilbeis is a randomly established household-based study involving 3 or 4 villages in the Nile Delta. Sick children are identified through monthly visits to houses and by school absenteeism. Such children are transported to the clinic for interview and examination by a physician, chest X-ray, collection of nasal aspirates and a serum sample. Treatment is prescribed as indicated. Parallel collections are made of blood from wild and domestic animals and of blood-sucking arthropods as well as from sentinel animals.

I. *Oromaxillofacial Infections (Anaerobic Bacterial Infections)*

The Dental Research Division of NAMRU-3 is investigating the pathogenesis and treatment of a variety of acute oral and maxillofacial infections. The Dental Division is part of a network of laboratories cooperating on various aspects of studies in this field. Collaborating institutions include University of Maryland Dental School, Naval Dental Research Institute and University of Texas Health Sciences Center, Houston. The highly advanced anaerobic culture capabilities in the Dental Division are unique in North Africa and Southwest Asia.

Resistance to antimicrobial agents is a significant problem in this region of the world and efforts are currently underway to identify the most effective antibiotics for treatment of acute, mixed infections. The microbiology and immunologic responses in severe, rapidly destructive forms of periodontitis are being investigated. Studies of the role played by putative periodontal pathogens in post-traumatic infections of the mandible are in progress.

RESEARCH PROTOCOLS:

The specific research protocols are listed below under their respective NAMRU-3 Work Unit or other funding source.

BASIC SCIENCES

***Title:* Basic Studies of Infectious Diseases of Military Importance**

Protocols:

1. Development of non-living prophylactic vaccines against human schistosomiasis
2. Evaluation of repellents and other personal protection strategies against arthropods of public health importance in North Africa and the Middle East
3. Evaluation of the ability of specific IgG subclasses from sera of *Schistosoma mansoni* infected patients to transfer immunity in a heterologous man-to-mouse system
4. Schistosomiasis mansoni: polyclonal anti-idiotypic antibodies as potential vaccines
5. Basic studies on diagnosis of schistosomiasis
6. A study of the invasiveness of *Campylobacter jejuni*
7. Pathophysiologic and immunological studies during bacterial sepsis
8. Studies on development and transmission of old and new world *Leishmania* in old world sandflies
9. Biochemical taxonomy, enzyme polymorphism, and population genetics of sandfly vectors of *Leishmania*
10. The impact of host immunity against vectors on arthropod-borne diseases
11. Study of referred undiagnosed fevers and obscure fever
12. Case-control study of immunologic and physiologic factors associated with successful recovery from acute diarrhea of known microbial etiology

RAPID DIAGNOSIS

***Title:* Technology Development on Rapid Diagnosis of Infectious Diseases of Military Importance**

Protocols:

1. Development of Polymerase Chain Reaction (PCR) - Based methods in the rapid diagnosis of bacterial infections

2. Establishment and evaluation of immunoperoxidase monolayer assay (IPMA) for rapid diagnosis of acute respiratory viral and arboviral diseases
3. Development of antibody-based and DNA detection-based assays for the rapid diagnosis of Leishmaniasis

EPIDEMIOLOGY

***Title:* Epidemiology and Threat Assessment of Infectious Diseases of Military Importance in Western Asia and Eastern Africa**

Protocols:

1. Infectious disease surveillance of U.S. operational forces deploying to the coastal areas of the Eastern Mediterranean, the Middle East and Eastern Africa
2. Epidemiology and disease assessment of non-enteric infectious diseases of military importance in Africa and Western Asia
3. Community based longitudinal study of acute respiratory disease and other febrile illness associated with arboviral, rickettsial or bacterial agents in Bilbeis, Egypt
4. Monitoring for *Aedes aegypti* and *Aedes albopictus* in Cairo, Egypt
5. Non-A, non-B viruses as etiologic agents of acute clinical hepatitis in Cairo, Egypt
6. The epidemiology of rickettsiosis in Egypt
7. Community-based double-blind placebo controlled study of the efficacy of two-single doses of ivermectin on *Wuchereria bancrofti* microfilaraemia
8. A community-based study of respiratory disease among Djiboutian children of ages 1 to 7 years
9. Village-survey Yemen
10. A clinical and epidemiological study of acute viral hepatitis

HIV

***Title:* Epidemiology of Retroviruses and other Human Pathogens Associated with Human Immunodeficiency Viral Infections in Northeast Africa**

Protocols:

1. HIV-associated tuberculosis in Djibouti: Epidemiology markers of disease progression, and the evaluation of the PCR technique for the diagnosis of TB
2. Surveillance for retroviral infections in Northeast Africa
3. Evaluation of diagnostic tests for retroviruses in Northeast Africa and Western Asia
4. Immunological and biological characteristics of HIV infection in Northeast Africa

PRODUCT EVALUATION

Title: Field Evaluation of Medical Defence against Infectious Diseases of Military Importance

Protocols:

1. Efficacy of a conventional B subunit/killed whole cell cholera vaccine in the prevention of diarrhea in U.S. operational forces deploying to N.E. Africa and Middle East
2. Comparative safety, immunogenicity and field protective efficacy of recombinant and conventional B subunit/whole cell cholera/enterotoxigenic *E. coli* vaccines in Egyptian children and adults

Title: A Placebo-Controlled Double-Blind Study of the Efficacy of a Topically Applied 1% Niclosamide Lotion in Preventing *Schistosoma mansoni* Infection in Egyptian Farmers (TAP)

DENTAL

Title: Basic Studies for the Development and Evaluation of Methods for Prevention or Interception of Acute Oral Conditions

Protocols:

1. Comparison of antibiotic susceptibility of bacteria from periapical abscesses in Egyptian and American patients
2. The roles for bacterial virulence and polymorphonuclear leukocyte (PMN) function in rapid, early onset periodontitis (EOP)
3. Basic studies of the microbiology of post-traumatic, maxillofacial infections
4. Epidemiology of dental disease within the Egyptian army

COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENTS (CRDAs)

Bioanthropology Foundation

1. The distribution and ecology of poisonous and non-poisonous snakes in the Arab Republic of Egypt

Merck, Sharp & Dohme

1. Evaluation of pediatric dose of recombinant hepatitis B vaccine in newly born infants in Alexandria, Egypt
2. Evaluation of immunogenicity of a hepatitis A vaccine
3. Comparison of chloramphenicol and norfloxacin in the chemotherapy of typhoid/paratyphoid fevers

PARTICIPATING AGENCY SERVICE AGREEMENT (PASA)

U.S. Agency for International Development (NAMRU-3 is the American Collaborator and Training Center for funded Egyptian Principal Investigators in the areas of schistosomiasis vaccine development and schistosomiasis immunodiagnosics development)

Protocols:

1. Development of an antipathology vaccine against schistosomiasis
(Theodor Bilharz Inst.)
2. Cloning of stage specific RNA/DNA encoding schistosome (Theodor Bilharz Inst.)
3. Human schistosomiasis: Mother-to-child vertical idiotypic lymphocyte sensitization and the potential for the development of anti-Idiotypic vaccine
(Cairo Univ.)
4. Toward the development of a vaccine for schistosomiasis (Ain Shams Univ.)
5. Identification, characterization and production of anti-schistosomiasis vaccine
(VACSERA, Agouza)
6. *Schistosoma haematobium* protective antigen(s); identification and gene cloning for vaccine production
(National Research Center)
7. Study of circulating schistosome antigen and antibody isotypes
(Theodor Bilharz Inst.)
8. Development and optimization of diagnostic means of active schistosomiasis
(Cairo Univ.)

7. PRODUCTIVITY

NAMRU-3 has a bibliography of nearly 2000 publications, and has provided numerous oral and poster presentations at medical societies worldwide.

A list of 30 officers and research professionals assigned to NAMRU-3 since 1947 include a Lasker Award winner, a Deputy Director of the NIAID, NIH, Commanding Officers at all levels in the U.S. Navy Medical Corps, including Flag Officers, the Head of Virology for the World Health Organization and numerous chairpersons of medical departments.

NAMRU-3 trains 30-50 U.S. military and civilian researchers per decade. The NAMRU-3 staff have assisted in training 30 Egyptian Ph.D. candidates, 7 medical doctors, 23 Master's level students and have provided on the job training for 142 technicians and 65 professionals.

NAMRU-3 provides operational support to the U.S. Navy and Marine Forces operating in this area. NAMRU-3 personnel supported operation Desert Shield/Storm as part of the Navy Forward Laboratory in Saudi Arabia, which introduced state-of-the-art infectious disease diagnostic capability to the theater.

8. SUMMARY

- NAMRU-3 is the Navy's largest and most sophisticated overseas medical research laboratory.
- Over the past 46 years the Unit has provided disease surveillance studies for southwest Asia and the Middle East.
- NAMRU-3 has the capacity to rapidly identify and characterize uncommon infectious disease threats that might occur in this geographic area.
- NAMRU-3 has the ability to deploy medical and scientific personnel expert in the infectious diseases of this geographic area.

9. ADDENDUM

MAILING ADDRESS

US Naval Medical Research Unit No. 3
PSC 453, BOX 5000
FPO AE 09835-0007

COMMUNICATIONS

Autovon: None
Commercial: Cairo 284-1381
From the United States: 011-202-284-1381
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DEFENSE DATA NETWORK (DDN)

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